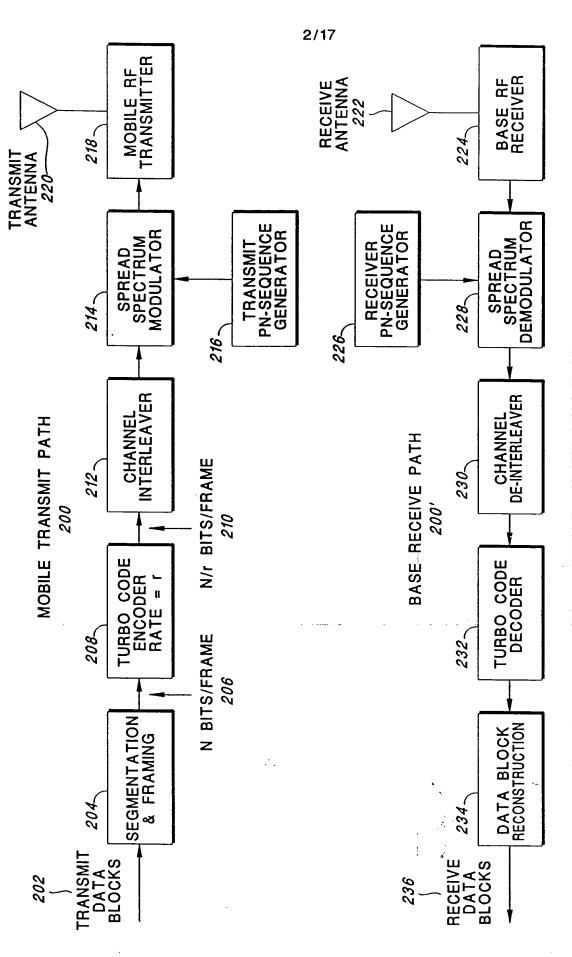
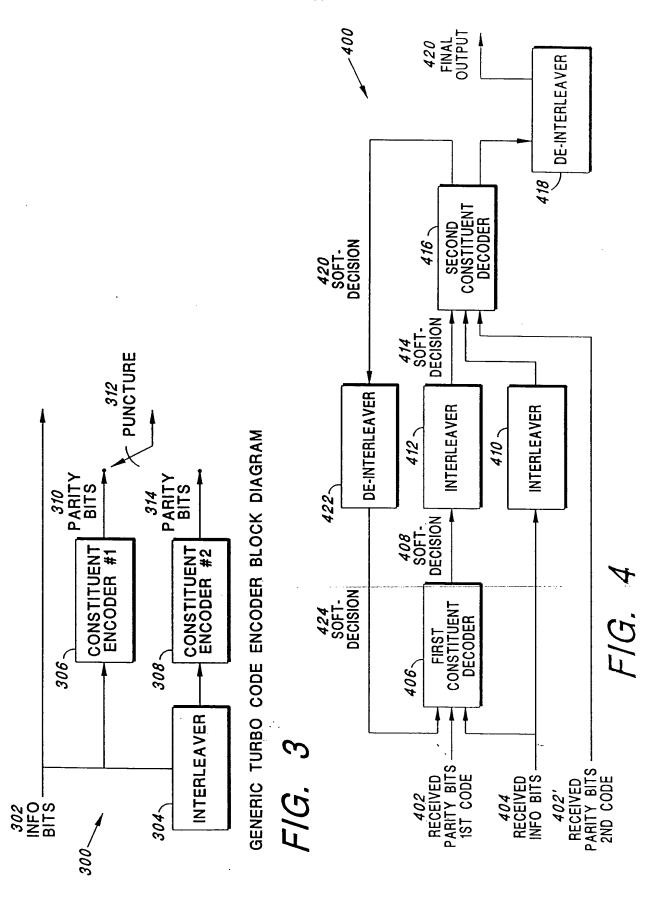


F/G. 1



OF A CDMA COMMUNICATIONS LINK USING TURBO CODES EXAMPLE

F/G. 2



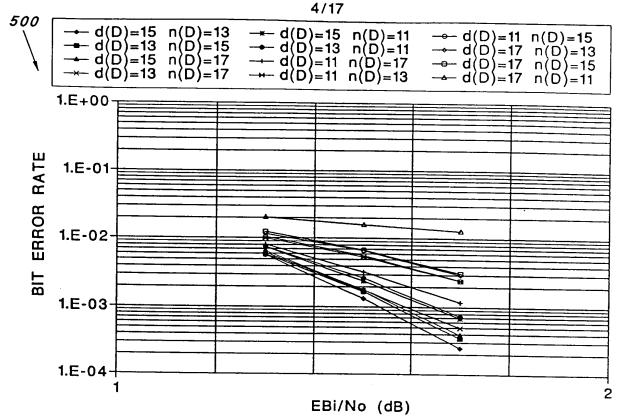


FIG. 5 RATE-1/2 TURBO CODES ON AWGN CHANNEL. (1000 BIT INTERLEAVER, 3 ITERATIONS)

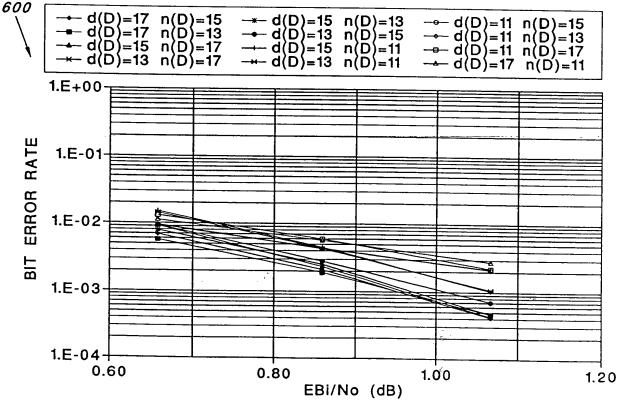


FIG. 6 RATE-1/3 TURBO CODES ON AWGN CHANNEL. (1000 BIT INTERLEAVER, 3 ITERATIONS)

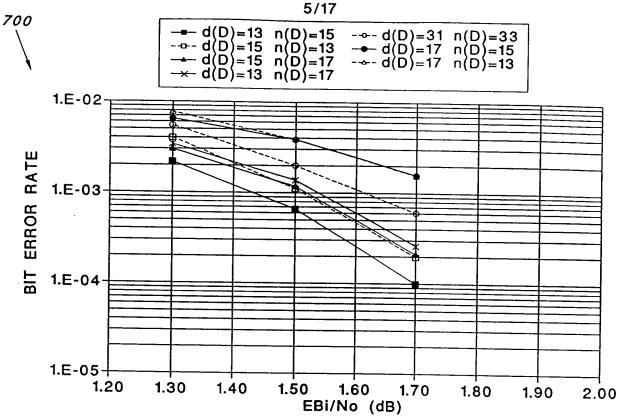


FIG. 7 SELECTED RATE 1/2 TURBO CODES ON AWGN CHANNEL, 512 BIT FRAME SIZE

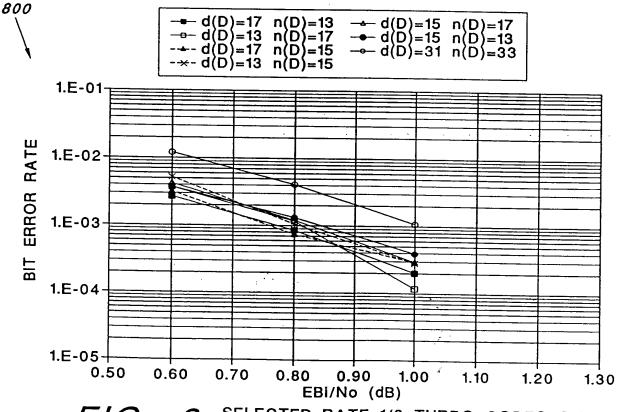


FIG. 8 SELECTED RATE 1/3 TURBO CODES ON AWGN CHANNEL, 512 BIT FRAME SIZE

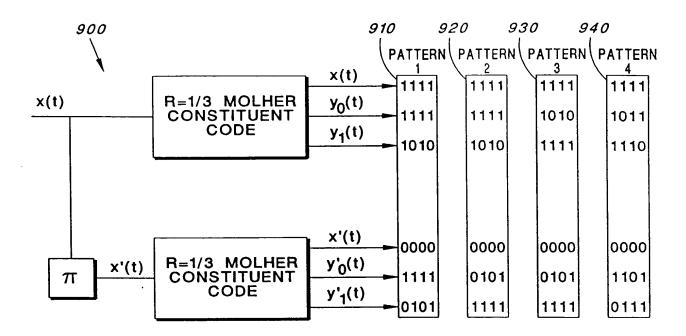
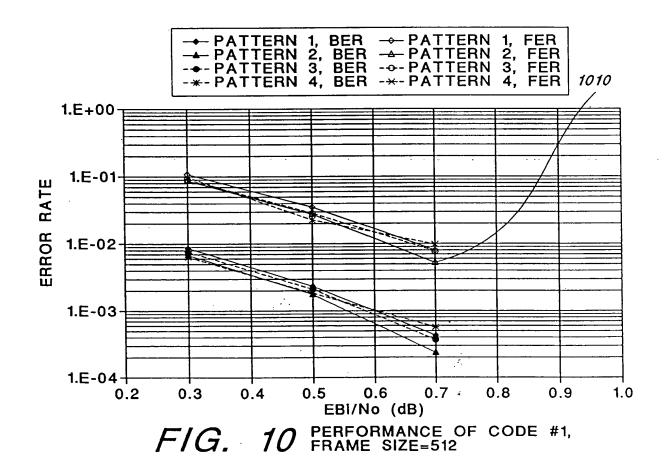


FIG. 9 PUNCTURING SCHEMES STUDIED FOR OPTIMIZING THE RATE 1/4 TURBO CODE





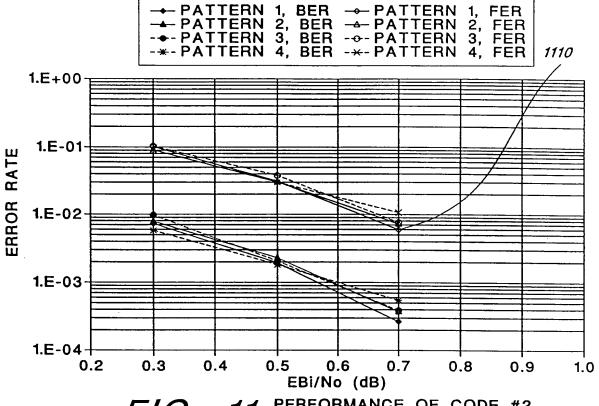


FIG. 11 PERFORMANCE OF CODE #2, FRAME SIZE=512

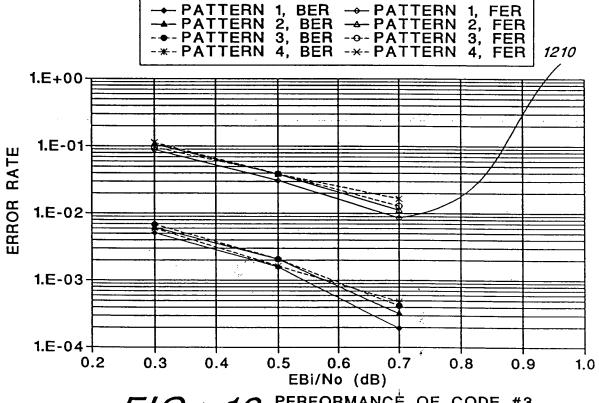


FIG. 12 PERFORMANCE OF CODE #3, FRAME SIZE=512



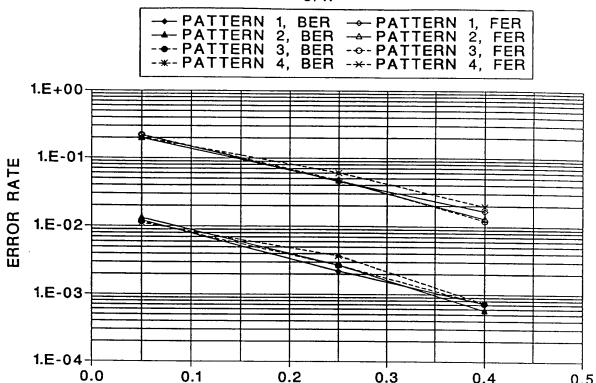
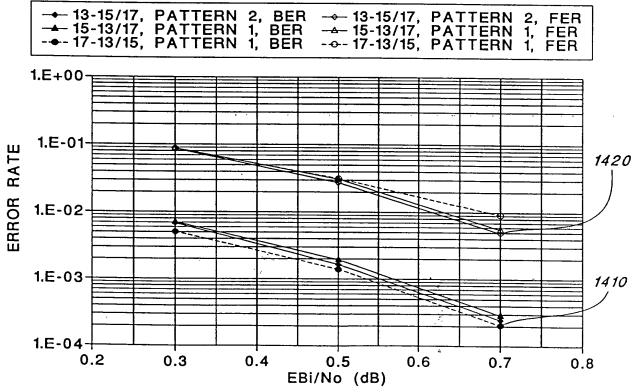


FIG. 13 BER/FEH PERFORM BER/FER PERFORMANCE OF CODE #1.

EBi/No (dB)

0.4

0.5



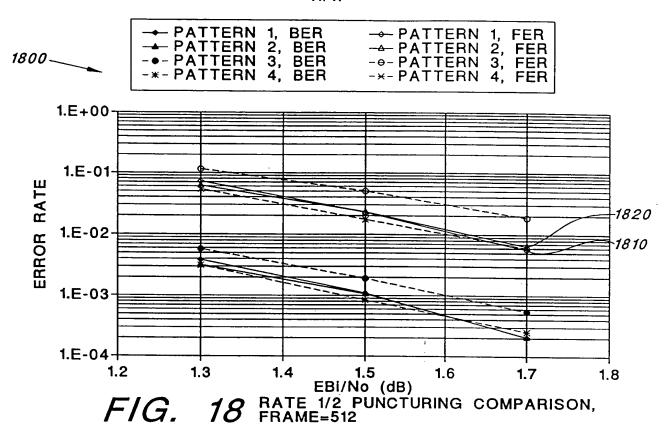
BER/FER PERFORMANCE OF SELECTED RATE-1/4 TURBO CODES, FRAME SIZE=512 FIG.

```
→ 13-15/17, PATTERN
                                          <del>→</del> 13-15/1<u>7</u>,
                             5, BER
                                                        PATTERN
                                                                    5, FER
     - 13-15/1<del>7</del>,
                PATTERN
                             6, BER
                                          <del>-----</del> 13-15/1<u>7</u>,
                                                        PATTERN
                                                                     6, FER
    - 15-13/17, PATTERN
                                          -e-15-13/17, PATTERN
                             5, BER
                                                                    5, FER
  -*- 15-13/17,
                PATTERN
                            6,
                                          -×-15-13/17, PATTERN
                                BER
                                                                    6, FER
  --- 17-13/15, PATTERN
---- 17-13/15, PATTERN
                             5,
                                          --- 17-13/15, PATTERN 5, FER
--- 17-13/15, PATTERN 6, FER
                                BER
                            6,
                               BER
                                          -x- Recommended Turbo Code (code B): FER
  Recommended Turbo Code (code B): BER
      1.E+00
1500__
       1.E-01-
   ERROR RATE
       1.E-02-
       1.E-03
       1.E-04-
             0.2
                        0.3
                                  0.4
                                             0.5
                                                       0.6
                                                                  0.7
                                                                            0.8
                                       EBi/No (dB)
                                COMPARISON AGAINST OTHER
            FIG.
                                PUNCTURING SCHEMES, FRAME=512
                   PATTERN
                                  BER
                                            → PATTERN
                                                              FER
                  - PATTERN
                               2,
3,
                                                            2, FER
3, FER
                                  BER
                                             --- PATTERN
1700-
                   PATTERN
                                  BER
                                            -e-PATTERN
                   PATTERN
                               4,
                                                            4,
                                  BER
                                            -×-PATTERN
                                                               FER
                               5,
                                            --- PATTERN
                                                            5,
                   PATTERN
                                  BER
                                                               FER
                +- PATTERN
                               6,
                                            → PATTERN
                                  BER
                                                            6,
                                                               FER
                ≖ PATTERN
                                            -X-PATTERN
                                  BER
    1.E+00
     1.E-01-
                                                                             1720
 ERROR RATE
                                                                             -1710
    1.E-02-
    1.E-03
    1.E-04 -
                   0.5
                           0.6
                                   0.7
                                          0.8
                                                          1.0
                                                                  1.1
                                                                          1.2
                              EBi/No (dB)
COMPARISON OF RATE 1/3
                              PUNCTURING SCHEMES, FRAME=512
```

1600	`\		2191			1618	_									
	1614 PATTERN 7	1111-1620	0 0 0 11622	1 1 1 0 - 1624	0 0 0 0 0 1626	0 0 0 1-1628	1110-1630									
	<u>1612</u> PATTERN 6	1111	1110	0001	0000	1110	0001		1646	PATTERN 4	111	1010	000	0 0 0	0000	101
	<u>1610</u> PATTERN 5	1111	1111	0 0 0 0	0 0 0 0	0 0 0 0	1111	E = 1/3								
	1608 PATTERN 4	1111	1110	0001	0 0 0 0	0001	1111	(a) TURBO CODE RATE	1644	IN 2 PATTERN 3		0 1000			0 0001	
	<u>1606</u> PATTERN 3 F		1010	101	0 0 0 0	1010	101	(a) TURBO	1642	1 PATTERN 2	111	0000			0000	
		1111						· ·	1640	PATTERN	1111	1010	0000		0 1 0 1	
	1602 PATTERN 1				0 0 0 0		,						`			

F/G. 16 ESSENTIAL PUNCTURING PATTERNS FOR RATE 1/3 COSTITUENT CODES

(b) TURBO CODE RATE =



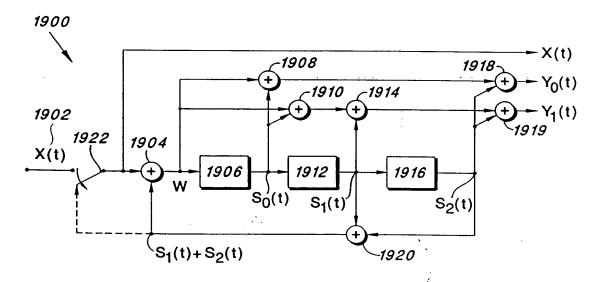


FIG. 19 UNIVERSAL CONSTITUENT ENCODER RECOMMENDED FOR FORWARD LINK TURBO CODES OF VARYING INTERLEAVER DEPTH

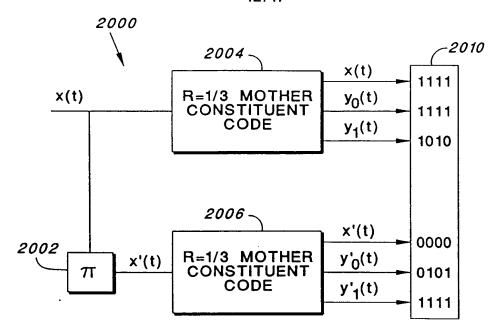


FIG. 20 FORWARD LINK TURBO CODE OF RATE 1/4 (MOTHER CODE IN FIGURE 19)

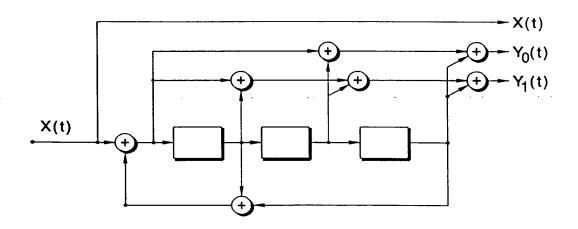


FIG. 25 CONSTITUENT ENCODER FOR REVERSE-LINK TURBO CODE

PATTERN 1	PATTERN 2	PATTERN 1	PATTERN 2
111	111111	1111	11111111
111	111110	1101	11011010
000	000000	0000	0000000
000	00000	0000	0000000
110	110111	1010	10101101
000	000000	0000	0000000

PUNCTURING PATTERNS FOR RATE 3/8 FORWARD LINK CODES

LINK CODES

PUNCTURING PATTERNS FOR RATE 4/9 FORWARD LINK CODES

FIG. 21

FIG. 23

PATTERN 1	PATTERN 2	PATTERN 3
1111	1111	1111
1111	1011	1111
1011	1111	1011
0000	0000	0000
1111	1110	1110
1110	1111	1111

PUNCTURING PATTERNS FOR RATE 2/9 REVERSE LINK CODES

FIG. 27

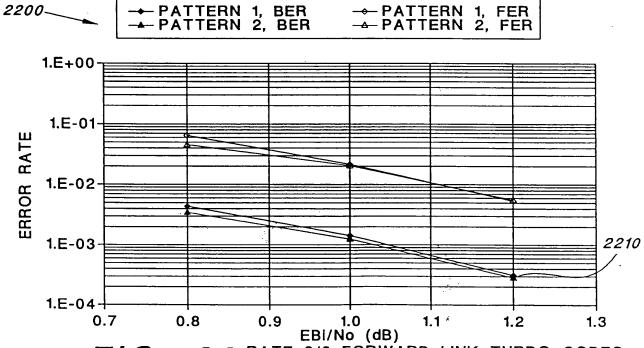
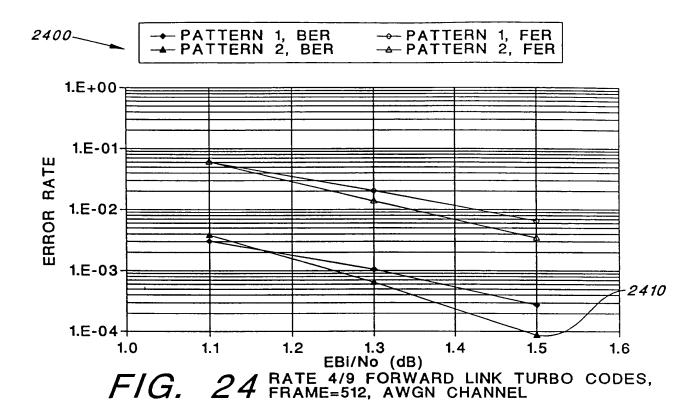
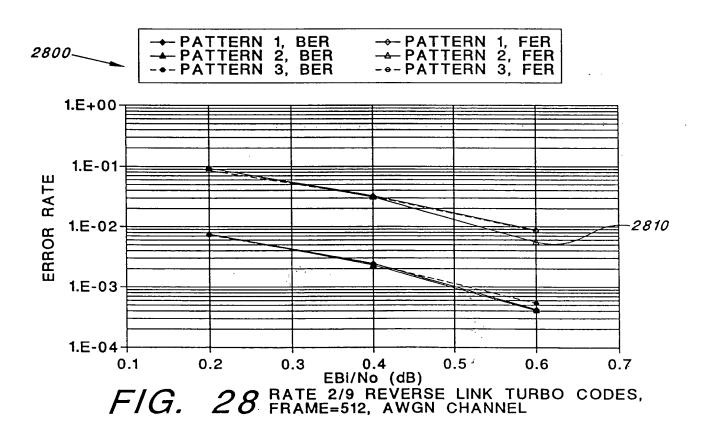


FIG. 22 RATE 3/8 FORWARD LINK TURBO CODES, FRAME=512, AWGN CHANNEL





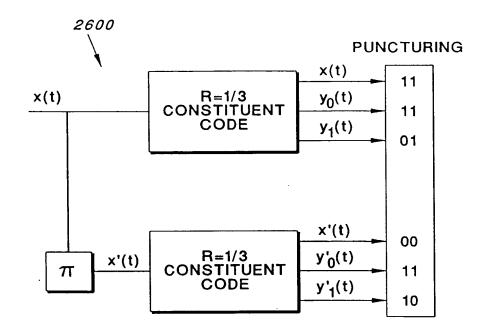
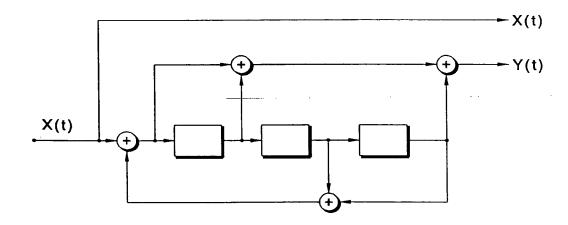


FIG. 26 REVERSE LINK TURBO CODE OF RATE 1/4 (MOTHER CODE IN FIGURE 25)

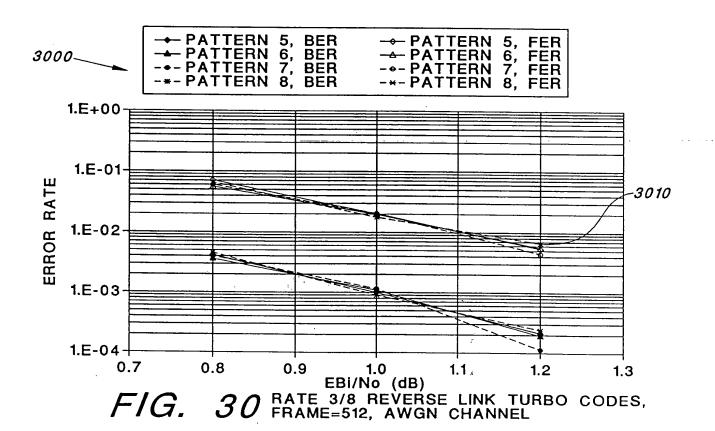


F/G. 31 UNIVERSAL CONSTITUENT ENCODER RECOMMENDED FOR R=1/2 AND R=1/3 TURBO CODES OF VARYING INTERLEAVER DEPTH

	16/17	
PATTERN 1	PATTERN 2	PATTERN 3
111	111	111
111	110	110
000	001	001
000	000	000
110	110	010
000	000	100
PATTERN 4	PATTERN 5	PATTERN 6
111	111	111
100	100	000
011	011	111
000	000	000
010	000	000
100	110	110

INITIAL PUNCTURING PATTERNS FOR RATE 3/8 REVERSE LINK CODES

FIG. 29



3200 → 15-13/17, PATTERN 1, BER → 15-13/17, PATTERN 1, FER \rightarrow g1(D)=463, g2(D)=535, g3(D)=733, g4(D)=745, BER \rightarrow g1(D)=463, g2(D)=535, g3(D)=733, g4(D)=745, FER 1.E+00-FRAME ERROR RATE 1.E-01 1.E-02

1.E-03

1.E-04

0.2

0.4

0.6

8.0

1.0

EBi/No (dB) COMPARISON OF RATE 1/4 FER-OPTIMIZED TURBO CODE VS CONVOLUTIONAL CODE, FRAME SIZE=512 FIG. 32

1.2

1.4

1.6

1.8

2.0

2.2